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Technical Report Writing

How to write a technical report

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Based on RapportSkriverVejl2002 by Anna Ledin

How to write a technical report

This document contains general recommendations on how to write a technical or scientific report and it is intended to support project work and scientific reporting. It describes a standard for report writing, and some alternatives. Every individual part of the report is described briefly in the following text. This note gives some general guidelines on writing a technical or scientific report.

It is of great importance to any engineer to have the skills to write a clear and concise report. The main objective of a technical report is to convey information clearly and well argued. When you are planning the report you should consider:

- What is the focus of the report?
- What are your key facts and conclusions?
- How do you make your key facts and conclusions as readily accessible as possible?
- Who are you writing for? Who is the client?
- What are the main limitations?

Language

The language of a report should be strict and focussed. Flowery, imprecise and vernacular language should be avoided. The target group is your fellow students and your supervisor as well as an external examiner (not used for all projects) so be sure to write in a suitable manor.

Formats

Make sure you use sequential numbering

There must be consistency in the use of fonts in the text

Front page

- The title of the report,
- Authors, including student numbers,
- When did you write and submit the report,
- In which course and at which department

Abstract

- Short summary of the report. It should include a short background of the problem, the aim and your major results as well as conclusions.
- Important that it can be read and understood on without reading the whole report.
- The abstract is one continuous text without subheadings
- App. ½ a page; usually with 200-500 words.

Summary

- A summary of the report. It should include a short background of the problem, the aim and your major results as well as conclusions
- To quickly present the main results of the project
- To quickly present the important recommendations and implications of the project
 - o What is the projects importance to the client? Its scope of application?
 - o Are there any important recommendations for future actions?
- Important that it can be read and understood on without reading the whole report.
- The summary is one continuous text without subheadings
- 1-2 pages

Preface

- Introduction to the reader about the circumstances for writing the report as well as acknowledgement, for example, external funding, industrial co-operation, supporting laboratory personal and supervisors.
- Sign the report and remember to include date and geographical location of signing (**all group members**).

Table of contents

The table of contents should be detailed to support the reader in finding a specific part of the report. It can also be a support to you in the process of writing so use the automatic function in the word processor already from the start.

Suggested outline:

Abstract or summary

Preface

Table of contents

List of figures

List of tables

1. Introduction
2. Theory
3. Materials and Methods
4. Results
5. Discussion
6. Conclusions
7. References
8. Appendices

1. Introduction

- Should give an introduction to the problem, by briefly explaining the scientific background of the topic in the report.
- Ends with the **problem formulation (objectives, hypothesis, and aims)**.
- The introduction should also present the reader to the problem formulation and which demarcations, if any, have been introduced.

The formulation of the problem is very important. It should be as short as possible; preferable only one sentence or one question.

Examples:

"Are there some long-term effects seen in humans due to the content of xenobiotics in cosmetics and personal care products, and if so, which groups are most exposed?"

"Can the use of best management practices improve the surface water quality in Lyngby sø"?

"Does the use of vegetable oils instead of chlorinated organic solvent result in production loss in the Danish printing industry"?

The problem formulation is something you have to address throughout the project in order to keep to the aim, so it is important to spend time on writing it carefully.

2. Theory

This chapter presents the theory that the reader needs in order to understand the results and the discussion. The theory chapter contains already well-established findings, and should therefore neither include your results nor a discussion. All information and statements included in the theory chapter must be followed by a reference to the information source. Direct quotes must be within "quotation marks".

2,2',4,4'-Tetrabromo diphenylether, a brominated flame-retardant, has been found to be present in both greywater and blackwater (Palmquist, 2001).

Numerous hazard ranking procedures and screening tools of chemical substances are described in the literature (see e.g., Swanson et al., 1997; Swanson and Socha, 1997; Hansen et al., 1999; Snyder et al., 2000).

Archer John Porter Martin and Richard Laurence Millington Synge shared the Nobel Prize in Chemistry in 1952 "for their invention of partition chromatography" (The Nobel Foundation, 2006).

3. Materials and Methods

This chapter presents the materials and methods which you have to use in order to produce your results.

Literature based project:

In a literature review it usually comprises of stating what sources have been used (hand books, encyclopaedias, journals, teaching materials, internet databases, governmental homepages etc), to what extent they have been used, for example, the time period (e.g., 1987-2007) and which keywords that were used as well as any

other significant information such as languages applied in the search (Scandinavian and English or English, French and Arabic).

Data collection project:

It is important to explain which chemical, physical, visual or biological methods you have used to obtain your data. Additionally, you must state why you have selected the applied methods and what types of uncertainties that are associated with the applied methods, especially if the uncertainties may affect the data interpretation, for example, sampling uncertainties or analysis uncertainties. If you have used a standardized method it is sufficient to state the protocol id (e.g. Danish Standard no. 221). If you have done method development, it is important that you describe the steps in such details that any of your fellow students can take your report and go directly into the laboratory and reproduce your tests. Furthermore testing procedures, test arrangements, questionnaires etc. should be explained in both text and illustrations (figures, pictures etc). When the data derive from samples collected in the field or if the study has been carried out on-site, detailed information such as maps, illustrations, satellite pictures or coordinates should be included.

4. Results

This chapter presents the results from your investigation. It includes typically all your data, presented either in the text or in tables and figures. Raw data used to produce figures and data related to calibration curves should not be placed here but in appendices. In addition, typical calculation procedures or protocols need step by step documentation in the appendix.

Clear and informative figures are important. It is generally better to make 7 small figures than one figure containing 7 datasets which may appear cluttered. Do not use unnecessary numbers on the axes, ensure that the font size is readable and omit the figure heading – use the figure text instead. Avoid grid-lines and use a white background. Figure text and number should be placed below the figure, table number and description should be placed above the table. Both the tables and the figures must be mentioned in the text, and the text shall explain the material in such a detail that the reader easily can comprehend the figure and/or table. Minimize unnecessary copying of figures and tables from literature. Use your own material whenever possible.

Part of this chapter is intended for presentation of your own data. The other part should be used to compare your results with that of other similar studies (e.g. average concentrations or measurement calculations) or in another way place your results in a context. More detailed and complex comparisons should however be saved for the Discussion chapter.

5. Discussion

You are discussing your findings and analyses in this chapter. For example, by interpreting them by further calculations or comparing them with other findings and

relating them to the theory given in the Theory-chapter. Furthermore, your findings should be discussed in relation to the problem formulation. Do all your data support your hypothesis or have you found contradicting data? Are the results in accordance with the theory, or if not, do you have any ideas why not? Can you postulate a conceptual model that can explain the findings; can the system be modelled by computer simulations and what can be concluded from the simulation results?

6. Conclusions

Here should your major conclusions be presented in ½ to 1 page. No new results or references may be introduced in the Conclusions-chapter.

Keep in mind that this is the answer to your problem formulation!

7. References

References can be written in many different ways. However, you have to follow any of those that it has been agreed about. For example:

Eriksson E., Auffarth K., Eilersen A. -M., Henze M. and Ledin A. (2003) Household chemicals and personal care products as sources for xenobiotic organic compounds in grey wastewater. *Water SA* **29**, 135-146.

Burrows W.D., Schmidt M.O., Carnevale R.M. and Schaub S.A. (1991) Nonpotable reuse: Development of health criteria and technologies for shower water recycle *Wat. Sci. Tech.* **24**, 81-88.

Or

L. Pan and J. Pawliszyn, *Analytical Chemistry* **69**, 196-205 (1997)

J.A. Field, and R.L. Reed, *Environ. Sci. Technol.* **30**, 3544-3550 (1996).

A. Ledin, K. Auffarth, E. Eriksson, M. Smith, A. -E. Eilersen, A. -M., P. Steen Mikkelsen, A. Dalsgaard and M. Henze, *Development of a grey wastewater characterisation method*. Report to the Danish EPA (2003) (in press) (in Danish).

Internet-links:

Lyngby-Taarbæk Municipality (2002) Information regarding wastewater sources and loads. Accessed online via

http://www.ltk.dk/teknik_miljoe/vand_kloak/renseanlaeg_lundtofte.htm (June 15th 2002) (in Danish).

ESIS (2007) European chemical Substances Information System (ESIS) version 5.00, provided by the European Chemicals Bureau. Available on the Internet at <http://ecb.jrc.it/esis/> (9/7-2007)

US EPA (2007) MTBE (methyl-t-butyl ether) in Drinking Water. Available on the Internet via <http://www.epa.gov/safewater/contaminants/unregulated/mtbe.html> (site last updated April 10th, 2007).

In the text they are written as follows:

A screening of grey wastewater from bathrooms confirmed the presence of almost 200 XOCs: surfactants, emulsifiers, fragrances, flavours, preservatives, antioxidants, softeners, plasticizers, UV-filters, solvents and additional compounds of domestic origin (Eriksson et al., 2003).

Fatty acids in liquid and air samples may be extracted by e.g. SPME (Pan and Pawliszyn, 1997) followed by derivatisation, which also is a method with low solvent consumption but cannot be applied onto solid samples.

Appendices

Here you document your raw data, standard calculations, methods, more elaborate basis and premises for your work etc. Place raw data here, together with calibration curves, analyses methods used which are not standard methods, your APV (work place assessment), any computer code you have developed and other relevant information regarding your work which is not needed in the actual report.

Remarks on cheating and plagiarism

The rules regarding cheating and plagiarism are given in DTU's Study Handbook - Rules and Regulations: 3.10 cheating at examinations. Here it is stated that:

- "Written assignments may be presented for assessment once only. Assignments previously assessed at DTU or other academic institutions may not be submitted for renewed assessment irrespective of the grade earned."
- "The rules regarding citations and references to sources in written assignments are that citations must be indicated by quotation marks at the start and end of the citation and the source of the citation must be referred to either in parentheses or in a note to the text. When not citing directly but basing the discussion on a specific source, the source must be referred to either in parenthesis or a note to the text. "

Cheating is if you:

- Fabricate and manipulate results
- Copy and paste without quotation marks and references
- Forget to cite literature
- Add a student that did not actively contributed to the work

Self plagiarism is if you e.g. reuse your own work in different courses

From [\\Erelearn\repository\E&R\Learning Objects\Cheating and plagiarism at E-R 2006.ppt](#) which can also be found on CampusNet.